

RTI in **MATH**

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and Darlene Crane

Gallery Walk (Poster 1)

Visit each poster.

Draw any mathematical symbol on the continuum arrow to indicate your understanding and implementation of each concept.

At your table, discuss the terms and how you rated yourself with your team.

Sample:

Academic Vocabulary

Academic vocabulary is explicitly modeled and integrated into my instructional setting (classroom, school, district).

Academic vocabulary has been identified and goals established to integrate into my instructional setting (classroom, school, district).

Awareness exists for the need to integrate academic vocabulary into my instructional setting (classroom, school, district).



Reflections

Curriculum-Based Measures (Poster 2)

Measures are fully implemented
and an integral part of decision
making regarding instructional
practices.

Measures are occasionally used
and provide guidance for reteach
needs.

I look forward to learning more!



Conceptual Understanding (Poster 3)

Several strategies are used to ensure that students demonstrate a conceptual understanding of the mathematics that empowers them to be problem solvers.

Students participate in activities to strengthen conceptual understanding.

An awareness of the need for conceptual understanding of mathematics is established.

Reflections

Common Core Mathematical Practices (Poster 4)

Mathematics practices are thoroughly integrated into every facet of mathematics instruction.

Mathematics practices from the Common Core Standards have been reviewed and goals are established for integrating into instruction.

I look forward to learning more about mathematics practices associated with the Common Core Standards.



Standard-Treatment Protocol and Problem-Solving Model (Poster 5)

Each model was thoughtfully considered and is currently fully implemented into our RTI mathematics model.

The pros and cons of each model are being considered for implementation within the mathematics RTI model.

I look forward to participating in a discussion regarding standard treatment protocol and problem-solving model.

Reflections

REPRODUCIBLE

Synopsis of Current Issues Impacting Math Instruction

Common Core Standards (K–5)

- Are focused on students developing a solid foundation in whole numbers, addition, subtraction, multiplication, division, fractions, and decimals
- Stress not only procedural skill, but also conceptual understanding that prepares students to succeed at higher levels, not just on the next test
- Are built on the best state and international standards to 1) provide detailed guidance to teachers on fractions, negative numbers, and geometry, and 2) maintain a continuous progression from grade to grade
- Are designed to prepare students for algebra in grade 8
- Are informed by top-performing countries, so that all students are prepared to succeed in our global economy and society
- Are evidence- and/or research-based
- Are embedded with mathematical practices that rest on processes and proficiencies with longstanding importance in mathematics education throughout all programmatic levels

Foundations for Success: The Final Report of the National Mathematics Advisory Panel (NMAP 2008)

- Curriculum for pre-K–8 should be streamlined.
- Conceptual understanding, computational fluency, and problem-solving skills are mutually beneficial and should be simultaneously developed.
- Student-centered versus teacher-centered instruction at the exclusion of the other is *not* supported by high-quality research. Each serves a critical role as part of well-designed mathematics instruction.
- Explicit instruction for students struggling with mathematics consistently shows positive results in improving students' achievement with word problems and computation.
- Teacher understanding of mathematics impacts student achievement.
- The use of instructional software (computer-assisted instruction or CAI) generally demonstrates positive effects on student achievement.
- Formative assessments demonstrate marginally significant improvements across student performance levels. This is especially true when teachers receive guidance on using assessment results to design and individualize instruction.

Common Core Reflection Guide

1. What insights to math instruction can teachers gain by reviewing mathematical practices associated with the Common Core Standards?
2. How will the mathematical practices impact instruction in your classroom, school, or district?
3. What supports will your teachers need to integrate the mathematical practices into instruction?
4. How did the review of the mathematical practices impact your understanding of teaching mathematics?

Connecting PLC–Collaborative Team Models to Effective Tiered Instruction for Mathematics

Tier 1: What Do We Want Our Students to Know?

Vertical and Horizontal Team Alignment

Grade-level teams review available resources that can include district learning goals, curriculum, and Common Core Standards. They also identify critical power standards for each grade level. As a vertical team, they compare goals for the beginning and end of year to ensure comprehensive, coherent alignment. Teams should consider how mathematics practices within Common Core Standards will impact instruction.

Example: Sandpiper Elementary School

Sandpiper Elementary School teachers from grades K–6 met as grade-level teams. After reviewing district grade level standards, each team created a list of the *most* critical math skills that students need to begin the year to access the grade-level curriculum. Teachers recorded these power standards on the left side of poster paper. On the right side of the paper, each grade-level team identified the most critical, mathematical power standard that students should have mastered by the end of the year. They arranged posters along the cafeteria wall, and vertical teams met to discuss the alignment and identify needed revisions.

Second Grade	
Beginning	End
1. Fluently add and subtract numbers to 20.	1. Mentally add and subtract through 20.
2. Understand place values through tens.	2. Determine place values through 100.
3. Compare length of three objects.	3. Draw picture and bar graphs.

Third Grade	
Beginning	End
1. Fluently add and subtract numbers to 20.	1. Multiply and divide to 100 to solve word problems.
2. Understand place values through 1,000.	2. Use place value to round numbers to nearest 10 and 100.
3. Explain data from picture and bar graphs.	3. Draw picture and bar graphs.

Personal and Team Reflection

What impacts mathematics curriculum in our setting?

Are there nonnegotiable areas regarding curriculum and instruction?

What collaborative structures do we have or need that will facilitate this process?

Tier 1: How Will We Know They Learned It?

Grade-level teams should ask:

- Are there mandated assessment tools?
- What assessment tools currently are available?
- How will the team use universal screeners, benchmarks, and authentic assessments?

Teams can address student needs and the need for improvement within mathematics instruction when they have grade-level plans for assessing students' mastery of critical mathematical content.

Teams should consider the co-development of authentic formative assessments. *RTI in Math: Practical Guidelines for Elementary Teachers* (Bender & Crane, 2010: 28–33) provides an explanation of some common assessments. Page 52 in the book offers an example of a team-created rubric for an authentic assessment.

Examples of Current Assessment Structures and Tools for Mathematics

- Universal screeners
- Benchmarks
- Progress monitoring
- Formative versus summative assessments
- Curriculum-based measures (CBMs)
- Authentic assessment

Recommended resource: rti4success.org/screeningtools

Personal and Team Reflection

How can the adoption of Common Core Standards impact assessment?

Do district mandates impact the answer to this question?

What will teachers need to develop a quality assessment plan?

Tier 1, 2, and 3 Decision Making: What Will We Do If Students Haven't Learned the Mathematics They Need?

PLCs or collaborative teams meet to review assessment information and determine emerging needs. Patterns might emerge that indicate the need for revised or enhanced Tier 1 instruction. Data also might show significant growth from one or two classrooms; this would provide a springboard for professional discussion regarding effective instructional approaches.

It is critical for collaborative teams to distinguish among the following needs: 1) enhancements of Tier 1 instruction, 2) efficacy of differentiated instruction in increasing student achievement, and 3) recommendations for strategic and intensive intervention.

When the need for Tier 2–3 interventions is evident, the PLC and collaborative team structure can be an effective avenue to identify who should deliver intervention, when to provide intervention, and which intervention strategies might accelerate students' mathematical achievement.

Example: Sandpiper Elementary School

The mathematics PLC at Sandpiper Elementary School administered a team-designed formative assessment to second-grade students for the identified critical skill, "Demonstrate an understanding of place value to three digits or the hundreds place." The team reviewed the information collected and determined that 68 percent of students could not demonstrate this critical skill. From this information, the team determined it needed to provide additional instruction and practice related to place value.

The school established one class group to extend the learning of 32 percent of students who did master the concept. The team also reviewed the available tool box of research related to teaching place value and identified two additional approaches to use. After three additional days of instruction, teachers administered the formative assessment, and the remaining 7 percent of students who did not master the concept were considered for Tier 2 intervention.

It is important to note that the team decided to group students across classrooms briefly (three days) to address this need, since a large percentage of students did not demonstrate mastery. This also allowed the team to focus on students who did demonstrate mastery, thus attending to another critical question used by PLCs, "What will we do for students who already have learned what we want them to know?" Effective tiered instruction addresses the needs of all learners.

Personal and Team Reflection

How have our teachers traditionally responded when students didn't learn mathematics?

Through the data, are we aware of current curricular or systematic weaknesses regarding math instruction? How can we address this?

Which collaborative teams will facilitate developing structures to support students who struggle with mathematics?

Improving Mathematics Instruction in Tier 1

Sample Lesson Design Integrated With Research-Based Instructional Strategies Explore and Ask

Authentic, challenging problem situations engage students in learning, creating excitement, motivation and interest in the mathematics.

Example

To introduce the mathematical concept of volume, small teams (two to three students) have three minutes to estimate which container holds the most paper clips. Each team receives one math tool of its choice for this challenge. The award is a no-homework night for the winning team.

Teach and Explain

- **Concrete-representational-abstract** (Maccini & Ruhl, 2000; Witzel, Mercer, & Miller, 2003): Instruction should be designed intentionally to introduce concepts for students to experience in a concrete manner. After students demonstrate understanding and can apply mathematics *concretely*, instruction transitions to the *representational* elements, including pictures, tally marks, and dots. As students develop *abstract* understanding of mathematics, they can move on to equations and algorithms that enable efficient problem solving. Teachers must maintain insight into student learning to appropriately pace this scaffolded instruction.
- **Think-alouds** (recommendation by National Math Advisory Panel, 2008): In addition to teacher think-alouds that model explicit mathematical thinking, students should receive opportunities to think aloud through mathematical practices. Think-aloud opportunities foster and deepen student understanding. This strategy also provides an opportunity for error correction and identification of misconceptions.
- **Vocabulary:** Teachers should consider mathematics as a second language. Ways to improve vocabulary are to: 1) use consistent, student-friendly language, 2) identify critical academic vocabulary to embed into learning, and 3) introduce mathematical synonyms that help students establish ownership of the mathematics. Graphic organizers can effectively strengthen student mastery of mathematical vocabulary.

Practice Opportunities to Build Problem Solving and Automaticity

- Scaffolded, guided practice
- Facilitative questioning (open-ended questions, connecting prior learning to new concept, bridge thinking): See next section “Ask the Questions” for sample questions.
- Math journaling

Ownership and Assessment

- Project-based learning
- Authentic assessment
- Student justification of answers

Ask the Questions

Sample Mathematical Questions to Prompt and Promote Student Learning **Questions to Ask During Inquiry Learning Experience**

- What do you recognize about this problem?
- What have we done before that is similar?
- What math skills do you already have that can help?
- What tools can help you? Why do you think that could be an effective tool?

Questions to Help Students Who Are Stuck

- What do you need to figure out?
- What is the problem, using your own words?
- What does the problem ask for?
- What information do you have?
- What have you done so far?
- What math strategy or tool might help?
- Can you draw a picture or diagram?

Questions to Check Student Understanding

- How does this relate to _____?
- Why is that true?

Questions to Promote Deeper Understanding and Problem Solving

- Can you think of a time when this would not work?
- How can you prove that?
- Can you create a math rule for that and convince your team?
- Why is this important?
- What other strategy can you use?

Questions to Summarize and Reflect on

- What new vocabulary did we use today?
- What will this mathematical concept or skill help us do?
- What are three key points from today's math time?

Doodle Family Project

Guiding Questions

Sample Sequencing Guide for a Project-Based Learning Experience

Task	Completed
1. Read the project guide.	
2. Look through information in the folder. Discuss with your team.	
3. Put all information (paycheck stubs, stock income) into one side of the folder.	
4. On the other side, put information that tells you how the family spends its money. (Tip: Stock information also can include this information.)	
5. Make a list of the family income. What is the total monthly income (the amount after taxes)?	
6. Make a list of monthly bills the family <i>has</i> to pay. (Tip: Consider bills that are optional and do not include them.) What is the total amount?	
7. Make a list of how much the family spends on groceries for three months and determine the monthly average.	
8. Make a list of how much the family spends on clothes for three months and determine the monthly average.	
9. Figure the total amount the family spends each month on "have to" bills, food, and clothing.	
10. Use data to determine how much money the family has left to cover other expenses.	

Questions to Facilitate Planning RTI in Mathematics

Tier 1 Questions to Facilitate RTIM

- What mathematics do we want our students to learn?
- What specific guidance is provided by state or district policies regarding mathematics instruction at each programmatic level (may include minimal time, class size, curricular goals, and materials)?
- What critical data do we need to guide our work?
- What do school data indicate about the effectiveness of Tier 1 instruction? Can we identify grade levels with greater needs?
- Does the current curriculum meet student needs? Are teachers adequately trained in mathematics instruction?
- Are collaborative structures (such as professional learning communities) in place that can focus on systemic, systematic improvements in Tier 1 instruction?
- Based upon review of data, do patterns of strengths and weaknesses emerge? How can we address those patterns through Tier 1 instruction?
- Is there clear vertical alignment in student mathematical skill development? For example, do grade-level teachers know which mathematical skills were addressed during the prior year? Do grade-level teachers know what teachers in the next grade level identify as critical entry-level skills? How does this knowledge influence the choice and use of a universal screener and progress monitoring tools?
- What assessments in mathematics currently are available that could be adapted for universal screening or progress monitoring?
- During this workshop, have we heard about tools that we should consider?

RTI for Mathematics Implementation Plan Tier 1 for

Grade Level	Schedule Needs and Concerns Requirements	Universal Screener (Preliminary Options)	Primary Curriculum	Supplemental Materials	Tier 1 Critical Next Steps (Based Upon Self-Assessment and/or Student Data)
Kindergarten					
1					
2					
3					
4					
5					

Tier 2 Questions to Facilitate RTIM

- How will teachers identify students for Tier 2 interventions? What criteria will we use?
- How can we adjust our current schedule to provide time for Tier 2 interventions?
- Based upon school data, which grade levels or classes have greater need for support? How can we provide that support within our staffing options?
- What Tier 1 mathematics support programs currently exist in our school? Can we restructure these to provide Tier 2 interventions for students struggling in mathematics?
- What organizational options are possible in our school for Tier 2 RTI in mathematics? For example, elementary schools often extend the time of the mathematics class. Most middle and high schools consider some type of additional intervention period. Will either work for us?
- What source of research-based interventions will teachers use? Do we need an alternate curriculum for Tier 2?
- How will we monitor student progress?
- Who is responsible for overseeing the identification and grouping process?
- Does our staff need additional professional development to implement Tier 2 interventions? Which staff members are best equipped for this task?
- Do we have collaborative structures in place (such as professional learning communities) that can identify and evaluate the effectiveness of Tier 2 interventions? How often do these communities need to meet to make this process effective?
- What documentation should we maintain?

RTI for Mathematics Implementation Plan Tier 2 for

Grade Level	Schedule Needs and Concerns Requirements	Universal Screener (Preliminary Options)	Primary Curriculum	Supplemental Materials	Tier 1 Critical Next Steps (Based Upon Self-Assessment and/or Student Data)
Kindergarten					
1					
2					
3					
4					
5					

Tier 3 Questions to Facilitate RTIM

- Based upon the review of school data, how many students per grade level need Tier 3 interventions?
- What faculty members serve as a best match to deliver Tier 3 mathematics interventions?
- If our school is in the early phases of implementation, when should we implement Tier 3 interventions?
- What curricular options are available? How do they align with students mathematical deficits, based upon data?
- What resources can support the implementation of Tier 3 interventions?
- Do we have a collaborative group to review curriculum options for Tier 3 interventions? How will the group establish review criteria?
- What scheduling options should our school consider? Are options available for double block periods? Before- and after-school options? “Mandatory” electives?
- What professional development for Tier 3 mathematics is necessary for our faculty? What timeframe is best?
- What adjustments in the current mathematics support program need to be made to meet the needs and expectations of Tier 3 intervention for RTI purposes? (Consider progress monitoring and intervention fidelity specifically.)
- What criteria will identify students in need of Tier 3 interventions?
- What assessments are available for progress monitoring?
- What data should we maintain?

RTI for Mathematics Implementation Plan Tier 3 for _____						
Grade Level	Schedule Needs and Concerns Requirements	Universal Screener (Preliminary Options)	Primary Curriculum	Supplemental Materials	Tier 1 Critical Next Steps (Based Upon Self-Assessment and/or Student Data)	
Kindergarten						
1						
2						
3						
4						
5						

Connecting PLC–Collaborative Team Models to Effective Tiered Instruction for Mathematics

What Will We Do If Students Haven't Learned the Mathematics They Need?

Tier 2–3 Decision Making: Mathematics Collaborative

Teams meet to review the assessment information and determine what student needs emerge in relation to the critical identified concept or skill areas. When Tier 2–3 interventions are needed, the collaborative team structure can be an effective avenue to plan for implementation. The team needs to make critical decisions, such as identifying: 1) who is best qualified to provide interventions, 2) when to provide interventions, and 3) intervention strategies that can effectively accelerate mathematic achievement.

Example: Sandpiper Elementary School

The mathematics collaborative team at Sandpiper Elementary School administered a team-designed formative assessment to grade-3 students for the identified critical skill, “Use place value understanding to round whole numbers to the nearest 10 or 100.”

The team reviewed information collected and determined that 68 percent of students could not demonstrate this critical skill. After three additional days of instruction, the formative assessment was re-administered, and the 11 percent (eight students) who did not master the concept were considered for Tier 2–3 interventions. Each student’s general education teacher conducted flexible interviews with the eight students; a special education teacher conducted one interview.

The collaborative team, which included each student’s general education teacher, determined that five of the eight students (Dimitri, Lori, Liz, Will, and David) should receive Tier 2 interventions based on ongoing skill deficits and results of flexible interviews.

Of the remaining three students, Lynn (who had missed several days of the initial instruction) would receive extra tutoring sessions but did not need Tier 2 interventions. Another student, Paul, was considered for Tier 3; he had received Tier 2 interventions during the previous school year and continued to struggle with number sense related to groups of ten. The third, Shalyn, had an Individualized Education Plan. After consultation with her special educator, it was decided that Shalyn would receive instruction through her IEP services to address skill deficits in the area of place value. This arrangement would prevent additional pull-out time from the classroom.

Formative assessment scores served as the baseline data for these students, and student data were collected and recorded on the team’s data collection chart.

The team began the planning for Tier 2–3 interventions using these questions:

1. Who is the best person to deliver the intervention?
2. What times can we make available for intervention?
3. Where will the intervention occur?
4. What intervention strategies align with these students' needs?

Personal and Team Reflection

What options are available for Tier 2–3 for mathematics?

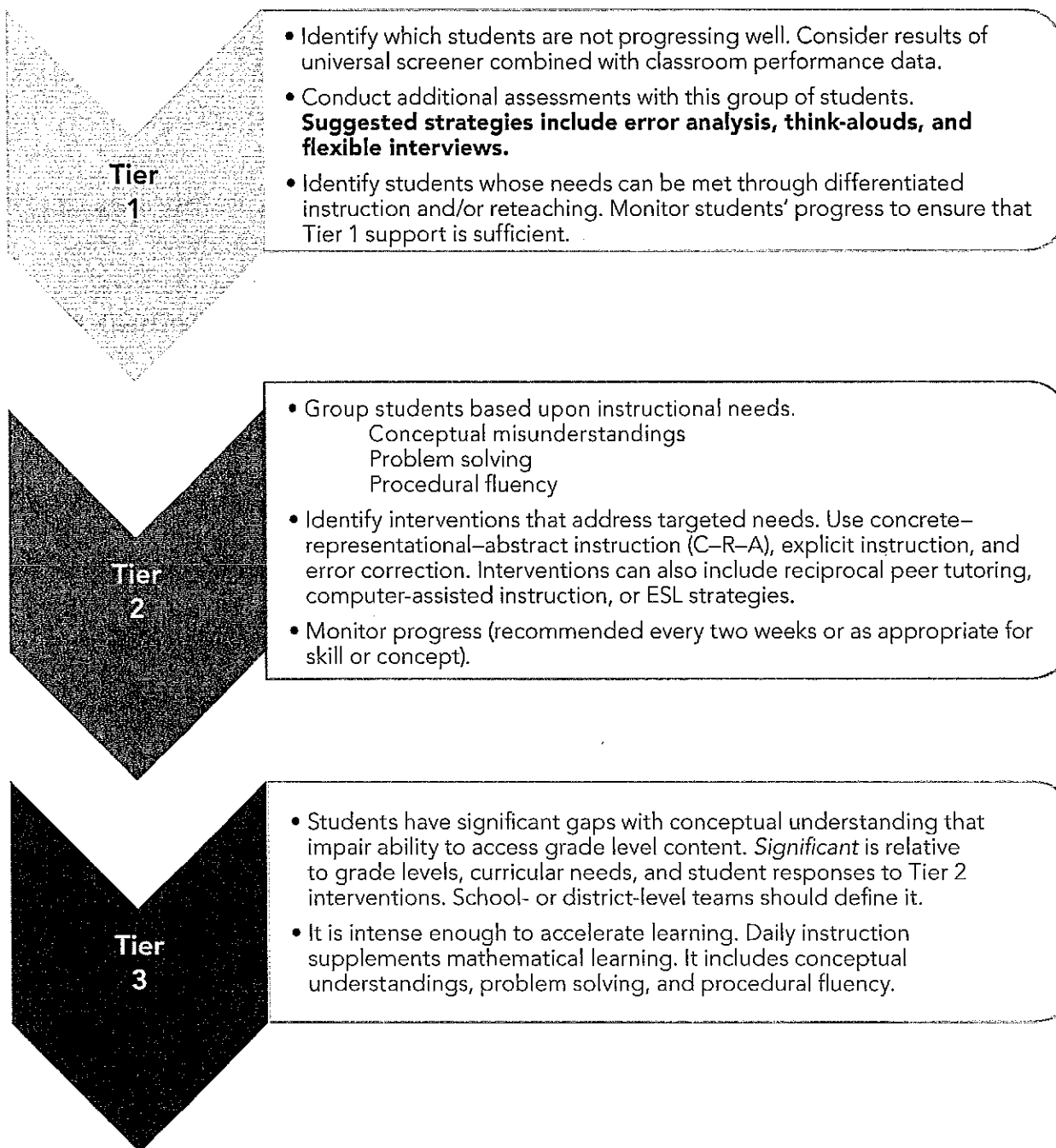
Who on our team would best serve our students as an interventionist?
Do we have the capacity for each teacher to serve as an interventionist?

Do we have computer-based instructional programs that can be a part of Tier 2–3 interventions?

What other resources for intervention strategies do we want to review or develop?

Identifying and Grouping Students for Interventions

Who?



Tier 2–3
Intro

Designing Instruction

Flexible Interview Sample Protocol

Each district or school should identify available data to pinpoint and group students who need mathematical intervention. Teachers can develop effective intervention lessons based on data derived from *universal screening*, *formative assessments*, *student interest inventories*, *error analyses*, and *flexible interviews*. (In particular, flexible interviews offer valuable insights into student mathematical processing.) These combined data sources help educators when designing lessons that target student needs and weave in motivational factors.

Task-Based Flexible Interview Protocol

1. Identify critical mathematical concepts. (Critical math concepts should have overarching importance in students' ongoing math literacy.) Examples include part-whole relationships, pattern identification, and place value.
2. Plan tasks that help students demonstrate conceptual understanding, automaticity, and skill in fluid problem solving.
3. Organize tasks in order of *concrete-representational-abstract*. Early childhood math expert Herb Ginsberg of Columbia University recommends beginning with a task that students can complete successfully.
4. Prompt students to use the *think aloud* process. Prompts may include:
 - Teach me how you would solve this problem.
 - What would you do first to solve this problem?
 - Think aloud while you work. Let me hear what you're thinking while you work.
 - Show and tell me how to solve this problem.
5. Use probing questions to extend and delve more deeply into student thinking.
 - Which tools would help you?
 - What were you thinking when you did that?
 - Which math skills must you know to do this?
 - Why did you do that?
 - How could you make the problem harder? Easier?
6. Increase complexity of tasks using concrete-representational-abstract process.
7. Record and evaluate insights into students' conceptual understanding. Use formal and informal data to make instructional decisions. Use collaborative team structures to identify potential instructional strategies for interventions.

Designing Instruction

Performance-Based Flexible Interview Protocol

Using Place Value to Round Numbers to the Nearest 10 or 100

Introduction

We have been rounding numbers to the nearest 10 and to the nearest 100. Today, we're going to make a video for the second-grade class to teach them how to round numbers to the nearest 10 and 100.

- What can you tell me about how to do that?
- Why do you think knowing how to round numbers is important?
- Should we put that in our video so the second-grade students know why they should learn how to round numbers to the nearest 10 and 100?

Prompt 1

What math tools would you use to teach the second-grade students how to round numbers to the nearest 10 and 100?

Follow-up prompts:

- What math tools have we used to practice?
- Which tool helped you the most?
- Would you use a number line, 100s chart, or base-10 blocks?

Prompt 2

Let us start by making a video showing how to round numbers to the nearest 10. Use the tool you chose, and you be the teacher. Pretending your partner is a second-grade student, teach your partner how to round the number 17 to the nearest 10.

Follow-up prompts:

- How does your math tool help?
- What can you tell me about 17?
- What does 7 stand for in the number?
- What does 1 stand for in the number?

Prompt 3

Now let us practice teaching how to round numbers to the nearest 100. Teach your partner how to round the 172 to the nearest 100.

Prompt 4

Tell me how understanding place value helps you.

Prompt 5

Tell me how to round 36 to the nearest 10 without the math tools. Round 498 to the nearest 100 without the math tools.

Personal and Team Reflection

What information could you learn about your struggling students with this assessment approach?




What additional prompts would you suggest?

How could you manage this approach in your setting?

Tier 2–3 Delivery Models

Multi-Classroom Per Grade-Level Configuration

Sample: Third Grade

<ul style="list-style-type: none"> • Experienced with differentiated instruction • Works with Tier 1 students who reached benchmark or are slightly below with some skill deficits 	<ul style="list-style-type: none"> • Loves to teach mathematics • Co-teacher assigned (math coach, special education teacher, paraprofessional) • Taught Tier 1 with small Tier 2–3 group work • Students below benchmark • Students flexibly grouped with teacher who can best meet their needs 	<ul style="list-style-type: none"> • Experienced with project-based learning • Teaches Tier 1 and enrichment • Students primarily above benchmark
Mr. Rigsby 	Mrs. Richards 	Mrs. Edwards 

Key Recommendations

Teachers meet at least quarterly to discuss student achievement as a whole.

- Skill deficits or conceptual misunderstandings that indicate systemic deficit
- Need for regrouping students based on progress
- Instructional best practices that proved to be effective

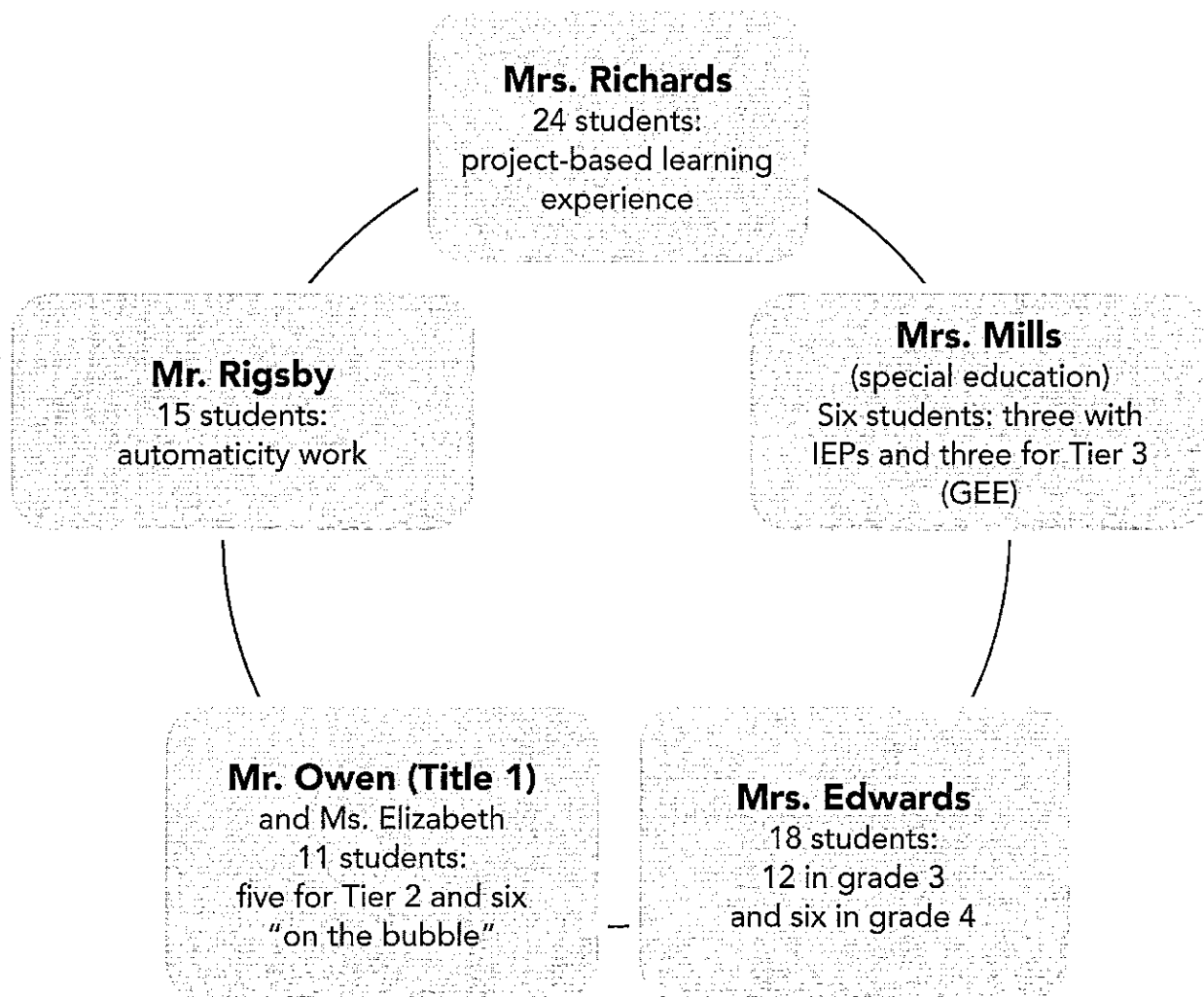
Data should include:

- Formative assessment specific to skills and concepts
- Progress monitoring measuring growth toward end-of-year goals (CBM)

Tier 2–3 Delivery Models

Intervention Block Model




1:15–1:45 p.m., Monday, Wednesday, and Friday



Tier 2–3 Delivery Models

Classroom Delivery Model

Note: Mrs. Mills (special education teacher) pulls four students from these classes the first 20 minutes of each day for Tier 3 interventions.

<ul style="list-style-type: none"> • On Wednesday, Thursday, and Friday: In first 20 minutes of class, meet with four students who need Tier 2 interventions. • Other students participate in work stations. Students who need Tier 2 also work on targeted skills with computer assisted instruction on Monday and Tuesday when Mr. Rigsby works with other groups. 	<ul style="list-style-type: none"> • On Monday, Wednesday and Friday: Extend math block by 20 minutes and meet with students who need Tier 2. • Other students work on projects, work stations, and/or automatically practice. 	<ul style="list-style-type: none"> • Meet with students who need Tier 2 interventions for 20 minutes, three times per week (flexible). • Students are assigned 15 minutes of computer-assisted learning practice per day.
<p>Mr. Rigsby</p> 	<p>Mrs. Richards</p> 	<p>Mrs. Edwards</p> 

Other Ideas

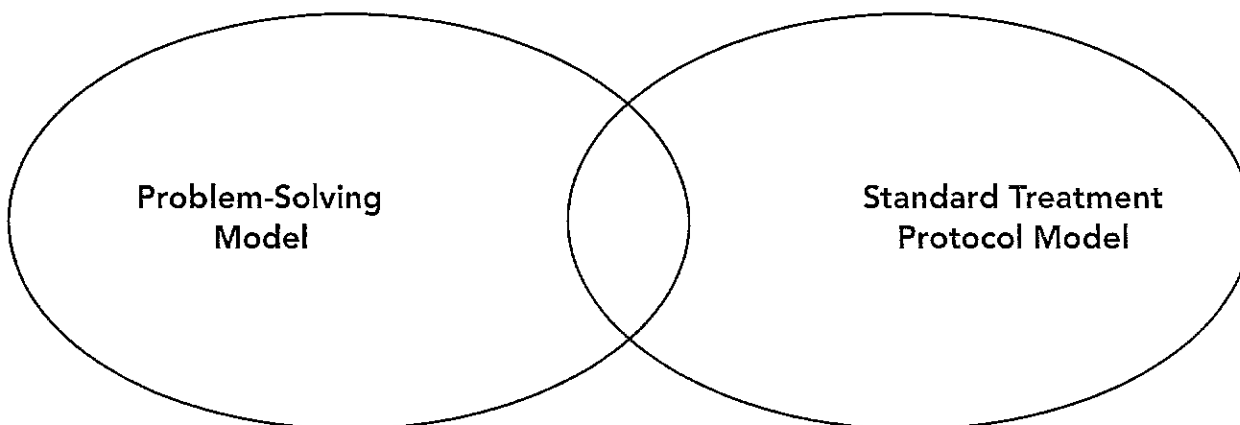
- Mandatory electives
- First-to-Lunch Bunch
- Breakfast Club
- Call back from lunch
- After school

Tier 2–3 Interventions Problem-Solving Approach

Students who need targeted Tier 2 instruction require high-quality math instruction that addresses their specific needs. *It is critical for educators who are serving as interventionists to recognize the urgent nature of this instructional time.* The purpose of providing interventions for students is not to provide watered-down or remedial instruction; the purpose of providing interventions in an RTI model is to accelerate student learning and to *prevent* academic failure. Two approaches to intervention include the **problem-solving model** and the **standard treatment protocol**. Each option must be evaluated by districts in regard to their schools' capacities and needs. Use the following graphics to evaluate the approaches and plan for your school's implementation.

Pros	Cons

**Tier 2–3
Problem-Solving**



Goals of Tier 2–3 Mathematics Instruction



Tier 2–3 Math Interventions

Research-Based Intervention Strategies

Reciprocal Peer Tutoring

Reciprocal peer tutoring (RPT) has research-demonstrated effectiveness for increasing student mathematical achievement. RPT has the added benefits of increasing student engagement and fostering positive student relationships. The critical difference between reciprocal peer tutoring and traditional peer tutoring models is the reciprocal relationship each partner experiences. Reciprocal peer tutoring is based upon the premise that each partner has an opportunity to serve as the coach and the student in a guided learning experience.

Sample Coach Prompts for Solving One-Step Story Problems

- Read the problem. Tell me the problem in your own words.
- What is the important information in the problem?
- Underline the critical words that tell you what you need to figure out.
- What tools can help you solve this problem or can you draw a picture?
- What operation will you use?
- Write the equation. Tell me how the equation matches the problem.
- Solve the problem. Tell me how you solved the problem.
- Tell me how the answer matches the problem.

Explicit Inquiry Routine (EIR)

The explicit inquiry routine designed by Scheuermann, Deshler, and Schumaker (2009) integrates explicit instruction with inquiry learning experiences based upon concrete–representational–abstract applications. In addition, the structure of this strategy embeds scaffolding of student learning. The four most basic elements of the EIR are listed below.

1. Teacher completes task analysis of the mathematical concept and provides explicit instruction.
2. Students explore the concept and build deeper understanding through inquiry. At each stage of exploration, the teacher provides scaffolded questioning and prompts.
 - Students tell the teacher how to manipulate and illustrate the problem.
 - Students tell each other how to manipulate and illustrate the problem.
 - Students develop self-talk as they work through the problem. Students' self-talk prepares them to justify their work.

Reciprocal Peer Tutoring Group Practice Activity

The soccer team is hosting a tournament for 20 area teams. To make sure there are enough water bottles at the concession stand, each team sent the number of parents and players coming. The team is buying water bottles that are sold in cases of 10. Round the number of team players to the nearest 10 and then add to get a total.

Teams	Players
South	43
Super Stars	77
Jeeps	84
Rapids	24
Fireballs	61
Blue Ice	39
Destroyers	95

Coach: _____

Coach: _____

Coach: _____

Coach: _____

Personal and Team Reflection

What capacity does your team have for using reciprocal peer tutoring as an intervention?

What are your team's thoughts of the PALS program and reciprocal peer tutoring?

For what grade levels in your district do you think this may be effective?

Mathematical Tier 2–3 Interventions Log and Lesson Plan

Intervention Focus: _____ Week of: _____

Interventionist: _____ Materials: _____

Planning Guide				
Monday	Tuesday	Wednesday	Thursday	Friday

Student Data			
Student Name, Baseline Data	Progress Monitoring Data	Notes	Absences

Mathematical Tier 2–3 Interventions Log and Lesson Plan

Intervention Focus: Rounding to the nearest 10 to add

Week of: October 15, 2012

Interventionist: Mrs. Crane

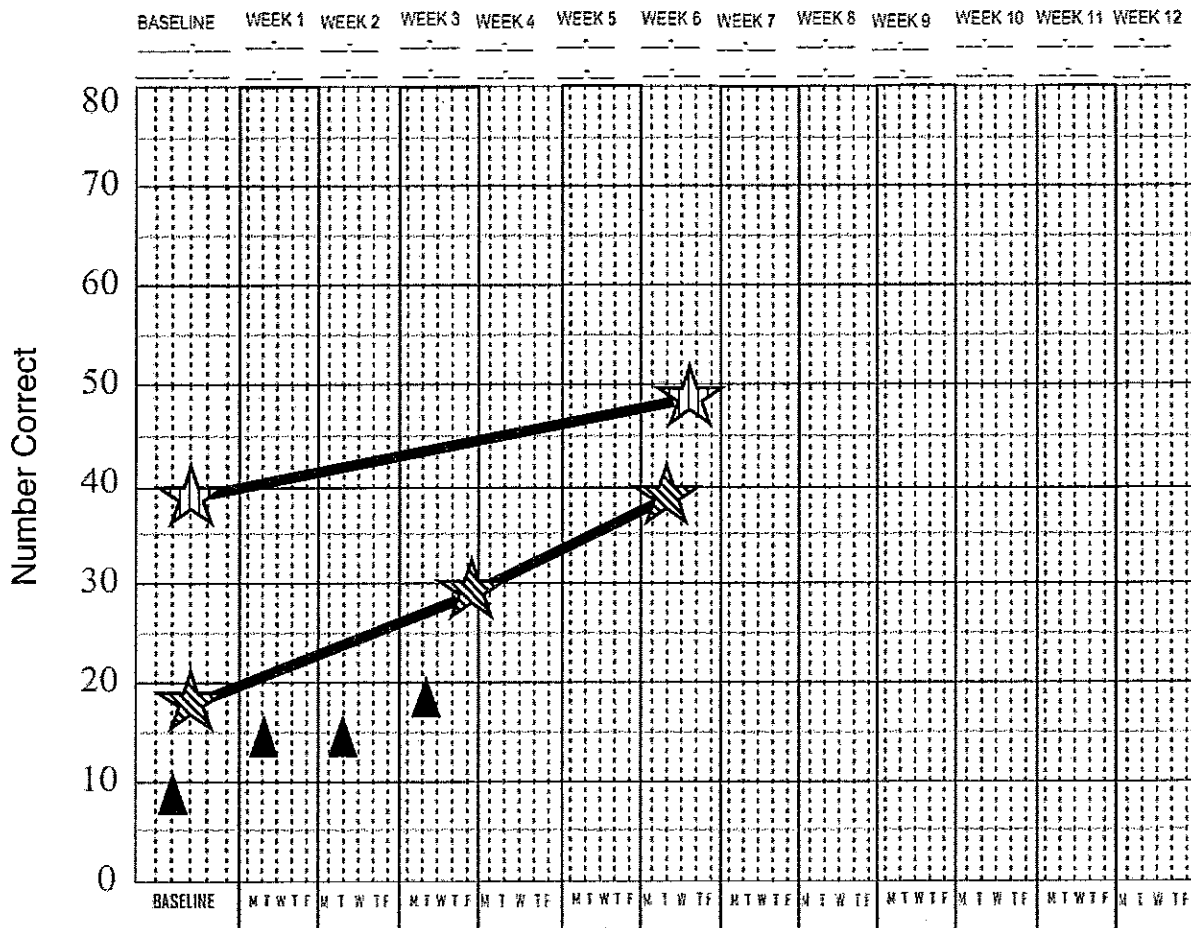
Materials: 100s chart, base 10 blocks

Planning Guide				
Monday	Tuesday	Wednesday	Thursday	Friday
Pose story problem that requires using rounding to nearest 10 to add. Explicitly model rounding to the nearest 10. Model first with number line and 1–10. Use “think-aloud” to include place value review. Prompt group to tell teacher how to manipulate the hundreds chart to round various numbers. Record new vocabulary in journal.	Review story problem. Prompt students as a group to tell you how to solve problems using hundreds chart. Question prompts should require students to use place value concepts. Change numbers in story; repeat. Students summarize process at end of class.	Review story problem. Students tell partners how to solve problem that requires rounding to nearest 10 to add. Teacher monitors student partner groups carefully. Correct misconceptions and use questioning to prompt.	Review story problem. Students self-talk through it; teacher monitors and listens to individual students. Students write about process and example in journal. (Some students may use illustrations.)	Students complete EasyCBM for progress monitoring. Teacher individually prompts students to think aloud one to three examples to ensure conceptual understanding.

Student Data			
Student Name, Baseline Data	Progress Monitoring Data	Notes	Absences
Lynn (3/20)	4/20	Can talk through with 100s chart with prompting	15th, 18th, 19th
Liz (7/20)	17/20	Moving to abstract; transition to nearest 100 group	
Owen (4/20)	9/20	Needs 100s chart	
Will (8/20)	12/20	Needs 100s chart	
Dimitri (5/20)	14/20	Needs 100s chart	
Lori	20/20	Abstract, fluid understanding	

Mathematics Tiered Interventions Student Data Collection

Student: Dimitri Classrm/Grade: Mrs. Crane Monitoring Level: Tier 2



Average class performance on grade level benchmark

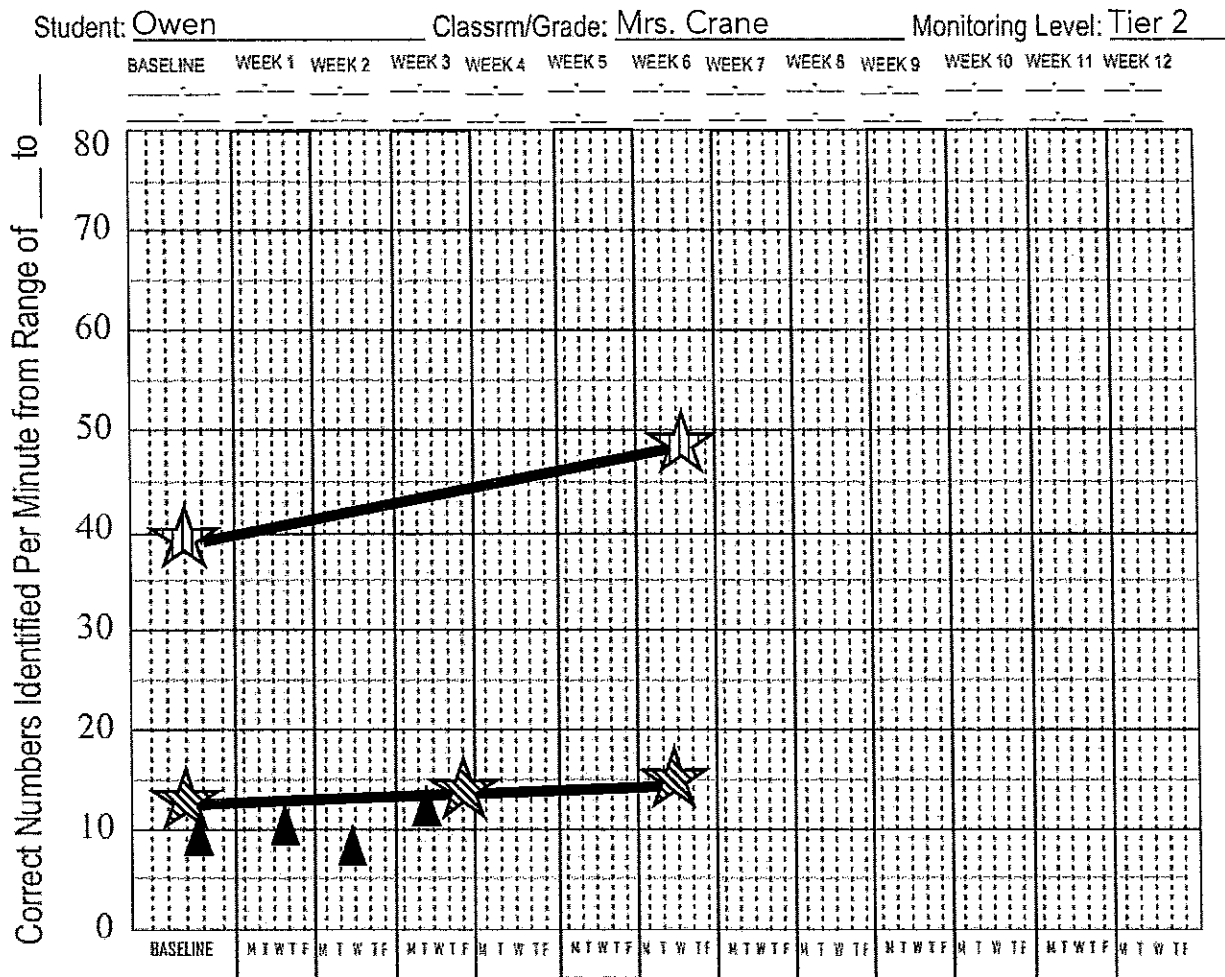


Dimitri's performance grade level benchmark/progress monitoring



Dimitri's performance on rounding numbers to the nearest 10 and 100 formative assessment

Mathematics Tiered Interventions Student Data Collection



Average class performance on grade level benchmark



Owen's performance grade level benchmark/progress monitoring



Owen's performance on rounding numbers to the nearest 10 and 100 formative assessment